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# **Enhancing the useability of systematic reviews by improving the consideration and description of interventions**

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The importance of adequate intervention descriptions in minimising research waste and improving research useability and reproducibility has gained attention in the last few years. Nearly all focus to date has been on intervention reporting in randomised trials. Yet clinicians are encouraged to use systematic reviews, whenever available, rather than single trials to inform their practice. This article explores the problem and implications of incomplete intervention details during the planning, conduct, and reporting of systematic reviews and makes recommendations for review authors, peer reviewers and journal editors.

Up to 60% of interventions in trial reports are inadequately described, although more information is sometimes available after contacting authors.<sup>1</sup> When interventions are inadequately described in randomised trials, clinicians and patients have to guess how to use effective interventions and researchers are unable to replicate or build upon the research. Another consequence of inadequately described interventions in trial reports is that the intervention details are not available to the authors of systematic reviews. Few studies have examined the problem of inadequate intervention description in systematic reviews. In an analysis of 58 systematic reviews of stroke interventions,<sup>2</sup> most reviews were missing information for the majority of items that are needed to make an intervention description adequate. For example, details such as the intervention procedure, materials, fidelity, and tailoring were missing from more than 80% of reviews. Inadequate intervention reporting in trials not only produces avoidable waste for the original trials but is compounded in downstream uses of the trials such as in systematic reviews - with implications for the reproducibility and useability of the systematic review.

Appropriate use of intervention details in the planning, conduct, and reporting of systematic reviews is facilitated if interventions are well described in trials and other evaluative studies. To assist authors to comprehensively describe interventions, the Template of Intervention Description and Replication (TIDieR) checklist and guide was developed and published in 2014, with an initial focus on helping authors of trials.<sup>3</sup> Historically, the development of systematic review techniques, methods, and technologies has focused on aspects such as searching, assessing and reporting risk of bias, and statistical methods. The clinical useability of the results of systematic reviews has had less attention, and intervention use and reporting in reviews almost none.<sup>4</sup>

To identify a common approach for improving the consideration and reporting of intervention details in systematic reviews a group of systematic review authors, trial authors, journal editors, methodologists, and statisticians with expertise in intervention descriptions, reporting guidelines, trials, and systematic reviews attended a 1-day meeting in Oxford in June 2016. Representatives from the following groups also attended: the Preferred Reporting Items for Systematic Reviews and

Meta-Analyses (PRISMA) group,<sup>5</sup> the Cochrane Library, the EQUATOR Network, the Template of Intervention Description and Replication (TIDieR) group,<sup>3</sup> the Evidence for Policy and Practice Information and Coordinating (EPPI) Centre, and the NIHR Journals Library. The meeting organisers (TH, PG) invited participants, drafted the agenda, invited presentations, and collected and disseminated background literature. The day consisted of stimulus presentations on key relevant topics and associated research. Each presentation was followed by group discussion during which detailed records about the discussion points and possible recommendations and implications for systematic reviews were made. In the final session of the day, the draft recommendations were discussed and modified collaboratively until group consensus was attained. Following the meeting, the group (authors of this paper) refined these recommendations, focusing on wordsmithing, during the writing of the paper.

**Recommendations to improve the consideration of interventions when planning, conducting, and reporting systematic reviews**

The Box contains recommendations that authors of systematic reviews should undertake to improve the consideration of interventions when planning, conducting, and reporting their reviews. Following the list of recommendations is an elaboration and explanation of each. The recommendations are applicable to all systematic reviews of studies of intervention effectiveness, including Cochrane reviews and non-Cochrane reviews. Suggestions specific to either Cochrane reviews or non-Cochrane reviews are detailed later in this section. For most systematic reviews, many of the recommendations also apply to the comparator intervention with these details needing appropriate consideration and reporting.

**Box. Recommendations for authors to improve the consideration of interventions when planning, conducting, and reporting systematic reviews**

| Planning the review   |
|---|
| <p><b>1. Consider intervention details during question formulation</b></p> <p>Use TIDieR<sup>3</sup> to identify any important details of the intervention that will determine the questions that the review will address, including how broad or narrow the review should be, and what the main comparison will be.</p> <p><b>2. Describe intervention considerations in the review protocol</b></p> <p>Describe the intervention and relevant components (if multi-component) and characteristics of it in the protocol. Relevant protocol sections may include: the review question, background, search terms, eligibility criteria, data items, and quantitative synthesis plans.</p> |

| Conducting the review   |
|---|
| <p><b>3. Extract intervention details as part of data extraction</b></p> <p>Use TIDieR as a guide to the essential intervention characteristics to include in the data extraction form and extract accordingly.</p> <p><b>4. Request missing intervention details</b></p> <p>When feasible, request missing intervention details from the authors using TIDieR as a guide to which details to request, and note when details are not available.</p> <p><b>5. Consider intervention characteristics during statistical analyses and exploration of heterogeneity when appropriate</b></p> <p>Where appropriate and feasible, consider intervention characteristics as specified in the protocol when grouping studies, conducting analyses, and exploring heterogeneity.</p>         |
| Reporting the review  |
| <p><b>6. Report intervention details in a summary table</b></p> <p>Provide a table that summarises the intervention details for each study (see template in web extra 1, and example in Table 1).</p> <p><b>7. Share intervention materials where possible</b></p> <p>Where intervention materials are available, share or provide their location details in the review's intervention summary table.</p> <p><b>8. Describe implications for future research</b></p> <p>If the summary of intervention details revealed important gaps in existing research, or if the analyses identified a significant association between effect and the presence or absence of intervention components or characteristics, describe the future research implications of this in the review.</p> |

### **Recommendation 1 – Consider intervention details during question formulation**

As many systematic review authors use a PICO format to design their review question, decisions about the I (intervention) part (and where necessary, its characteristics; and if a multi-component intervention, the major components) should be given as much consideration as the other parts. Authors should use TIDieR to identify any important details of the intervention that should determine the questions that the review will address, for example, which active components are used, the timing of the intervention, the dose, the mode of delivery, or who provides the intervention. Such details will also help to inform the breadth of the review. If a scoping exercise was performed as part of the planning of the review, summarising the intervention details (such as in a summary table, see Table 1) from studies located during the scoping exercise may help inform

this decision. Authors should also carefully consider intervention details when deciding on the main comparison that will be made in the review.

## **Recommendation 2 - Describe intervention considerations in the review protocol**

When registering a systematic review title (such as at PROSPERO; [www.crd.york.ac.uk/PROSPERO/](http://www.crd.york.ac.uk/PROSPERO/)) and writing a protocol, authors should carefully consider and describe the intervention and relevant components (if multi-component) and characteristics of it. Items in the reporting guideline for systematic review protocols (PRISMA-P) that are particularly relevant to this include: Items 7 (explicit statement of the review question), 8 (eligibility criteria), 10 (search strategy), 12 (data items), and 15a (criteria for quantitative synthesis).<sup>6</sup> Further details about sections of the protocol relevant to intervention details are provided below:

*Background:* If relevant, protocol authors should report how consideration of details of the intervention affected the scope of the review and categorisation of interventions within this scope. Where relevant, authors should also clarify why differences in the details of the intervention might modify its effects - for example, which active components are used, the timing of the intervention, the dose, the mode of delivery, or who provides the intervention.

*Objectives:* Intervention details may determine the main comparisons that will be made and should be considered when deciding on the review's objectives.

*Eligibility criteria:* Intervention details may be part of inclusion or exclusion criteria and should be clearly stated. When intervention details in potentially eligible studies are not stated or not clear, this step in a review can be compromised.

*Data extraction:* Protocols should include plans for collecting sufficient details about the interventions so that they can be described adequately. TIDieR items can be used as a guide to which intervention characteristics should be incorporated into the data extraction form.

*Missing information:* Because trial reports often do not adequately describe interventions but trial authors can often provide missing details,<sup>1,7</sup> at the protocol stage, review authors should plan to request missing intervention details from the investigators.

*Statistical analyses, such as subgroup, dose-response, and meta-regression:* Decisions about appropriate inclusion and grouping of studies for analyses often requires knowledge of the characteristics of the interventions that were studied. When there is a reason to believe that differences in intervention characteristics (for example, the dose) might lead to different effects, these differences should be identified in the protocol, together with the basis for the assumptions

they might modify the effect of the intervention, the expected direction of effect modification, and a plan for undertaking a subgroup analysis or sensitivity analysis. In network meta-analyses, creating nodes can be difficult if the interventions are not sufficiently described.

### **Recommendation 3 - Extract intervention details as part of the data extraction process**

As specified in the protocol, during the data extraction stage, review authors should extract details of the essential intervention characteristics (guided by TIDieR items) for each included study. to include.

### **Recommendation 4 - Request missing intervention details**

If, after extracting intervention details from the primary studies and other available sources (such as online supplements or trial websites), intervention details are missing, review authors should request the missing details from the authors where feasible. When review authors attempted to contact trial authors and did not receive a response or intervention details were unable to be shared, this should be noted in the review. This will alert readers of the review that intervention details are unlikely to be available and this may inform their choice of intervention and also save them from trying to obtain details in vain.

### **Recommendation 5 - Consider intervention characteristics during statistical analyses and exploration of heterogeneity when appropriate**

When considering reasons for heterogeneity, having sufficient information about the characteristics of the interventions evaluated may be very important. Where appropriate, decisions about grouping studies and conducting analyses should incorporate knowledge of intervention details as specified in the protocol.

### **Recommendation 6 - Report intervention details in a summary table**

Review authors should provide a table that summarises the intervention details for each study (see example in Table 1 and the blank table provided as a template in web extra 1). The column headings are based on the TIDieR items. A summary table serves a few purposes, including to: assist readers to compare the characteristics of the interventions and consider those that may be feasible for implementation in their setting; highlight interventions that have missing or unavailable details; show which trials did not specify certain characteristics as part of the intervention; and highlight characteristics that have not been studied in existing trials. Review authors should list all trials and not omit from the table trials that provided evidence that a certain intervention was not effective. Knowing the details of an intervention that was not effective may inform future research. Moreover, it is helpful for readers to know that a particular implementation of the intervention in a



specific context or when compared to a specific control did not work (context may be particularly important for non-drug interventions).

### **Recommendation 7 - Share intervention materials**

During the review process, review authors may gather intervention materials (for example, informational materials provided as part of the intervention) from trial authors. Intervention materials are the most commonly missing element of intervention descriptions,<sup>1</sup> even though interventions cannot be faithfully implemented without them. If review authors have obtained permission to do so, these materials should be deposited in online repositories (such as Figshare, Dryad, Open Science Framework or OpenTrials), or in online supplementary materials of the review, and their availability and location indicated in the intervention details table in the review.

### **Recommendation 8 - Describe implications for future research**

Review authors should summarise the intervention details of included studies (such as in a summary table as suggested in Recommendation 6). If this summary reveals important gaps in existing research - for example, if no or few interventions used a particular component (for multi-component interventions) or dose/intensity or delivery method, this should inform the future research section of reviews. Similarly, if analyses conducted within the review identify that particular characteristics or components of the intervention were (or were not) significantly associated with effect, this is also useful to inform future research. Most of the time, the heterogeneity in effect sizes that may be explained by one or more specific characteristics of an intervention is not definitive as such assessments are generally confounded by other study features. Also in the discussion section of the review, authors should consider and justify the extent to which the review findings support conclusions about whether any of the differences in intervention details lead to important differences in effects.<sup>8,9</sup>

### Cochrane reviews

Authors of Cochrane intervention reviews are expected to follow the Methodological Expectations for Cochrane Intervention Reviews (MECIR). The revised MECIR standards released in October 2016<sup>10</sup> now reference TIDieR as a guide when collecting and reporting intervention characteristics (Standards C44 and R65). Information about TIDieR has also been added to Cochrane author training materials.<sup>11</sup> Cochrane authors are encouraged to provide a structured account of intervention details in the table of 'Characteristics of included studies'. They are also able to provide an additional summary table with intervention details for each study (as shown in Table 1,

which comes from a Cochrane review<sup>12</sup>), and share intervention materials gathered during the review (see Recommendation 7, Box) as appendices to the review.

[insert Table 1 about here – see end of paper]

### Non-Cochrane reviews

Authors of non-Cochrane reviews are encouraged to follow the recommendations listed in the Box. The relevant PRISMA-P items are listed earlier in the elaboration of Recommendation 2. The relevant PRISMA items include: item 1 (title), 2 (abstract), 3 (rationale), 4 (objectives), 6 (eligibility criteria), 8 (search), 9 (study selection), 10 (data collection process), 11 (data items), 18 (study characteristics), 25 (limitations), and 26 (conclusion and future research). Modification of guidance for the relevant PRISMA<sup>5</sup> and PRISMA-P<sup>6</sup> items will be considered when these reporting guidelines are next updated.

Recommendations for peer reviewers and editors of systematic reviews: As with other research replicability and reporting issues, peer reviewers and editors also have a role to play in helping to ensure that interventions are appropriately considered and reported in systematic reviews. They should be guided by many of the recommendations in the Box and check that interventions are clearly defined and intervention details are appropriately considered in analyses, reported as completely as possible, and considered in the review's discussion, conclusions, and where appropriate, the future research section.

## **Using the findings of a systematic review: the importance of knowing intervention details**

New trials should be designed according to what is already known from systematic reviews.<sup>13</sup> Providing complete intervention descriptions in systematic reviews is important for informing researchers as they develop and modify interventions to evaluate in future studies (see Recommendation 8).

Clinicians, patients, and policymakers cannot implement effective interventions if details of the interventions are not known. Review users should be able to compare the details of the interventions and consider whether and, if so, how to implement interventions in their setting (see details in the elaboration of Recommendation 6, and section below). As well as individual decisions, having appropriate intervention details may also influence broader decisions such as those about reimbursement or adapting standard practices. The useability of many downstream evidence resources that incorporate systematic review findings (such as clinical guidelines, patient decision aids) is also influenced by whether the interventions are appropriately detailed in the review. The

safety of an intervention can also be compromised if there is not transparency about all its characteristics.

### **Choosing which intervention to implement**

It is not our intention to provide guidance about methods for selecting interventions for clinical implementation from those included in a systematic review. Such decisions need to be informed by multiple considerations<sup>14</sup> including: the size of the desirable effects; the size of the undesirable effects; the balance between the desirable and undesirable effects (considering patients' preferences and how much people value the main outcomes); the certainty of the evidence; resource requirements; cost-effectiveness; impacts on equity; and intervention feasibility, acceptability, and availability of intervention details. Because these considerations go beyond the evidence that is included in most systematic reviews and as there is no optimal method of selecting a particular intervention from those included in a review, in most circumstances it is not appropriate for review authors to nominate a single recommended intervention. Details of approaches for choosing an intervention are described elsewhere.<sup>14,15</sup> However, all of the approaches require detailed descriptions of the intervention, and some of them also require detailed descriptions of the comparator interventions.

Although review authors generally should not make recommendations about a single intervention, they may wish to provide a summary paragraph of the known considerations when choosing an intervention. This may be particularly helpful if users of the review choose to follow a 'single-trial-based choice' approach.<sup>15</sup> In this approach, users of the review examine the trials and consider the effects (benefits and harms) and risk of bias of single studies; then consider the context, feasibility and requirements of the various interventions. A summary table of intervention details (such as in the example in Table 1) may assist the user with this step. While the information that needs to be considered and summarised will obviously depend on the intervention being reviewed, an example of the broad content that a summary paragraph in a review might include is: *"Among the [number of] trials, there are [number of] trials that have a low risk of bias and have sufficiently described interventions. All of these involved [list common characteristics], but there are a number of variations to consider, depending on ....[cost, time, risk of harms, training requirements, availability,.....]."*

### **Further research**

Many aspects of using and reporting intervention details in systematic reviews need further research. For example, studies should explore various methods for reporting intervention details, and for incorporating intervention details into forest plots so that effect sizes, risk of bias, and

intervention characteristics (and availability of intervention details) can be considered simultaneously. Incorporating intervention details into the conduct and presentation of overviews and network meta-analyses<sup>16</sup> also needs exploring. The extent to which review authors make changes to the scope of eligible interventions (and how broad or narrow this is) as reviews progress from registration, to protocol, to a published review is not known. More complete intervention reporting at each of these stages of a systematic review is necessary to progress this research agenda. Research with end-users of reviews (including clinicians, patients, guideline developers, and policy makers) to better understand how they use review results and which details influence their choice when deciding between interventions would also be valuable. Further research is also needed into approaches, such as Qualitative Comparative Analysis<sup>17</sup> and logic models,<sup>18</sup> for identifying which configurations of intervention characteristics and contextual features<sup>19</sup> are critical for successful outcomes.

## **Conclusion**

Improving the completeness of intervention descriptions in systematic reviews is likely to be a cost-effective contribution towards facilitating evidence implementation from reviews and reducing the research waste that is caused by reviews failing to consider and provide sufficient details about the interventions. With implications for being able to reproduce and implement systematic reviews, all of those with a role in producing, reviewing, and publishing systematic reviews should commit to helping to solve this remediable barrier.

## **Summary points**

- Intervention details are rarely fully considered or completely reported in systematic reviews, limiting the reproducibility and useability of systematic reviews – this is wasteful.
- Intervention details are needed in many stages of the review process – from question formulation, to decisions about eligibility and analyses, to results interpretation, and use of the review findings.
- Systematic review authors should give careful consideration to intervention details during the planning, conduct, and reporting of the review, including extracting, requesting and fully reporting them.
- Improving the consideration and description of interventions in systematic reviews, such by providing a summary table with details, will likely contribute to reducing avoidable waste in health research.

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**Table 1 Example of table summarising intervention details (for each TIDieR item<sup>3</sup>) in a systematic review (from Coxeter et al<sup>12</sup>)**

| Author Year         | Brief name  | Recipient        | Why  | What (materials)   | What (procedures)   | Who provided   | How   | Where                                  | When and how much   | Tailoring     | Modification of intervention throughout trial | Strategies to improve or maintain intervention fidelity | Extent of intervention fidelity |
|---------------------|---|------------------|--|--|---|--|---|--|---|---------------|---|---|---------------------------------|
| <b>Altiner 2007</b> | Complex GP peer-led educational intervention              | GPs and patients | Focused on communication within a consultation and the mutual discordance between patients' expectations and doctors' perceived patient expectations, empowering patients to raise the issue within the consultation. By 'informing' both sides in the consultation, it is hoped that doctors and patients would openly talk about the issue and thus reduce unnecessary antibiotic prescriptions. | Peers used a semi-structured dialogue script for outreach visits.<br><br>Patient materials (leaflet and poster) provided in waiting room primarily focused on the patients' role doctor-patient 'antibiotic misunderstanding' and brief evidence-based information on acute cough and antibiotics. | GP peer-led outreach visits. Peers were trained to explore GPs' 'opposite' motivational background to address their beliefs and attitudes. GPs were motivated to explore patient expectations and demands, to elicit anxieties and make antibiotic prescribing a subject in the consultation<br><br>Patient materials were aimed at empowering patients to raise and clarify issues within the consultation | 5 practising GPs and teaching academics in the lead authors' department (2 female, 33 to 63 years of age); trained in 3 sessions for outreach visits | Face-to-face outreach visits to GPs   | GP clinics during normal working hours | 1 outreach visit performed per GP (duration not specified)  | Not described | Not described                                 | Not described   | 51/52 GPs received intervention |
| <b>Briel 2006</b>   | Brief training programme in patient-centred communication | GPs              | Focused on teaching GPs how to understand and modify patients' concepts and beliefs about the use of antibiotics for ARIs. GPs were introduced to a model (Prochaska 1992) for identifying   | Evidence-based guidelines for diagnosis and treatment of ARIs (updated, locally adapted and reviewed by local experts) distributed as a  | GPs were trained in elements of active listening, to respond to emotional cues, and to tailor information given to  | Not specified  | Seminar in small groups (number not specified) and personal feedback by telephone prior to the start of the | Not specified                          | Attendance at 1 x 6-hour seminar and 1 x 2-hour telephone call to give personal feedback prior to the trial start | Not described | Not described                                 | Not described   | Not described                   |



|                    |  |                             |  |  |  |  |   |  |  |  |               |               |  |
|--------------------|--|-----------------------------|--|--|--|--|---|--|--|--|---------------|---------------|--|
|                    |  |                             | patients' attitude and readiness for behaviour change  | booklet [ <i>URL provided is no longer active</i> ]  | patients. Physicians used a model were introduced to a model (Prochaska 1992) to identify patients' attitude and readiness for behaviour change  |  | trial. Evidence-based guidelines were distributed as a booklet  |  |  |  |               |               |  |
| <b>Butler 2012</b> | Multifaceted flexible blended learning approach for clinicians | GPs and nurse practitioners | <p>Blended learning experience to develop clinicians' sense of the importance about change and their confidence in their ability to achieve change based on Social Learning Theory</p> <p>Clinicians reflected on practice-level antibiotic dispensing and resistance data, reflected on own clinical practice (context-bound learning), and were trained in novel communication skills derived from principles of motivational interviewing</p> | Summaries of research evidence and guidelines, web-based modules using video-rich material presenting novel communication skills, and a web-based forum to share experiences and views (see <a href="http://www.stemmingthetide.org">www.stemmingthetide.org</a> for online component) | Intervention consist of 7 components: experiential learning, updated summaries of research evidence and guidelines; web-based learning in novel communication skills; practising consulting skills in routine care; facilitator-led practice-based seminar on practice-level data on antibiotic prescribing and resistance; reflections on own clinical practice, and a web-based forum to share experiences and views | A facilitator conducted the face-to-face seminar | Intervention consisted of 7 parts (5 online modules, 1 face-to-face seminar and 1 facilitator-led practice-based seminar) | The face-to-face and facilitator-led seminars were presented at the general practice | <p>7 components (5 online, 1 face-to-face and 1 facilitator-led practice-based seminar)</p> <p>A booster module (6 to 8 months after completion of initial training) reinforced these skills</p> | Intervention was flexible so clinicians could access the online components and try out new skills with their patients at their convenience | Not described | Not described | 138/139 completed all online training and uploaded descriptions of consultations for the portfolio tasks; 129/139 attended the practice-based seminars; 76/139 completed the optional booster session at 6 months; 11/139 entered new threads on the online forum with 81 posts and 1485 viewings of posts and threads |
| <b>Cals 2009</b>   | Enhanced communication   | GPs                         | Focused on information exchange based on the elicited  | Pre and post-workshop transcripts of   | Brief context-learning based workshop in   | Experienced moderator                            | Brief workshop (5 to 8 GPs),  | General practice   | 1 x 2-hour moderator-led small groups  | Not described  | Not described | Not described | 66% of patients recruited  |

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|                     | tion skills training  |  | provide-elicited framework from counselling in behaviour change - exploring patients' fears and expectations, patients' opinion on antibiotics and outlining the natural duration of cough in lower respiratory tract infections | simulated patients  | small groups (5 to 8 GPs), preceded and followed by practice-based consultations with simulated patients. GPs reflected on own transcripts of consultations with simulated patients, which were also peer-reviewed by colleagues   | to lead seminars      | preceded and followed by practice-based consultation with simulated patients  |                                  | workshop, preceded and followed by practice-based consultation with simulated patients  |               |               |  | by GPs allocated to training in enhanced communication skills recalled their GP's use at least 3 of 4 specific communication skills compared with 19% in the no training group |
| <b>Francis 2009</b> | Interactive booklet for parents and clinician training in its use | GPs and patients                                     | Focused on specific communication skills, such as exploring parent's main concerns, asking about their expectations, and discussing prognosis, treatment options and reasons that should prompt re-consultation                  | 8-page booklet (now at <a href="http://www.whenshouldiworry.com">www.whenshouldiworry.com</a> ); online training in use of the booklet included videos to demonstrate use of the booklet within a consultation, as well as audio feeds, pictures and links to study materials [original URL no longer active] | Booklet given to parents to use in the consultation and as a take-home resource (no further details provided)<br><br>Online training on the use of the booklet was provided to GPs: describing the content and aims of the booklet, and encouraging use within the consultation to facilitate use of specific communication skills | N/A (online training) | Parents used the booklet face-to-face in the consultation with GPs and took it home; GP training in use of booklet was online | General practice; parents' homes | 1 x 40-minute online training module  | Not described | Not described | Online clinician training monitored through study website: whether a GP has logged on to the site, how much time spent on it and which pages were viewed | Stated that treatment fidelity was not measured so that assessors could remain blind to the study group  |
| <b>Légaré 2012</b>  | Shared decision making training program (DECISION+2)              | Family physicians (including teachers and residents) | A shared decision making training program that aimed to help physicians communicate to patients the probability of a bacterial ARI and the benefits and harms  | Online tutorial and workshop included videos, exercises and decision aids to help physicians communicate to their patients  | Online self tutorial comprising 5 modules 2-hour online tutorial followed by a facilitator-led on-site   | Trained facilitators  | Online tutorial and face-to-face workshop   | Family practice teaching units   | 1 x 2-hour online tutorial, followed by 1 x 2-hour on-site interactive workshop. Participants had 1 month to complete the programme | Not described | Not described | Not described  | Of the 162 physicians, 103 completed both the online tutorial and  |

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|                    |   |  | associated with the use of antibiotics  | the probability of bacterial ARIs and benefits/harms of antibiotic use. Decision aids were available in the consultation rooms in all family practice teaching units  | interactive workshops aimed to help physicians review and integrate concepts acquired during online training   |  |   |                        |  |               |   |               | workshop; 16 completed only the workshop; 15 only the tutorial; and 28 completed none of the training components |
| <b>Légaré 2011</b> | Multiple-component, continuing professional development program in shared decision making (DECISION+) | Family medicine groups (physicians and nurses) | Aimed to help family physicians communicate to patients the probability of bacterial ARI and benefits and harms of antibiotic use   | Workshops included videos (simulated consultations of usual care and SDM) and exercises (facilitators and barriers to SDM). GPs trained in the use of 5 decision support tools using video examples and group exercises. A booklet summarising workshop content provided to participants. Postcard reminders sent | Interactive workshops and related material, reminders of expected behaviours and GP feedback on agreement between their decisional conflict and that of their patients | Trained facilitators   | Face-to-face workshop   | Family medicine groups | 3 x 3-hour interactive workshops and related material, in addition to reminders of expected behaviours and GP feedback on agreement between their decisional conflict and that of their patients. DECISION+ conducted over 4 to 6 months | Not described | 4 pilot workshops held rather than 3 as the second workshop was redesigned and re-piloted after feedback on its first testing | Not described | Not described  |
| <b>Little 2013</b> | Internet-based training in enhanced communication skills  | GPs  | Rationale was that Internet-based training can be more widely disseminated than face-to-face training. Training focused on eliciting patients' expectations and concerns, natural disease course, treatments, agreement on a management plan, | Interactive booklet for use by GPs within consultations. Training supported by video demonstrations of consultation techniques  | Online modules and an interactive booklet for use within consultations. (Group practices also appointed a lead GP to organise a structured meeting on                  | N/A (online modules) other than lead GP at each practice to organise a meeting (not specific to just this arm of the | Online modules (and GP-led structured practice-based meeting) | General practice       | Internet modules completed alone or in a group   | Not described | Not described   | Not described | 94/108 practices (87%) completed the communication training. Mean (SD) time spent on the website                 |

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|                       |  |  | summing up and guidance on when to re-consult  |   | prescribing issues)  | intervention though)             |  |               |   |               |               |               | was 37 (29) minutes |
| <b>Welsche n 2004</b> | Group education meeting with consensus procedure and communication skills training | GPs/pharmacists and their assistants, and patients | GPs discussed evidence for antibiotic benefit/risk, and learned communication techniques to explore patients' expectations and concerns, inform about natural course of symptoms, self-medication and alarm symptoms. Patient education provided information on the self-limiting nature or ARIs, self-medication and alarm symptoms requiring re-consultation | Group consensus guidelines and patient waiting room materials (poster/leaflets) | Group education meeting with consensus procedure, with a summary, and guidelines mailed 1 month later to reinforce consensus reached; feedback on prescribing behaviour (post- and pre-intervention insurance claims data) and practice-level reporting of extent prescribing behaviours aligned with consensus reached; group education session for GP and pharmacists assistants (Dutch guidelines and skills training in patient education); waiting room educational material for patients | Jointly led by GP and pharmacist | Group education meeting for GPs with consensus procedure and communication skills training,<br><br>Group education for GPs' and pharmacists' assistants, monitoring and feedback on prescribing behaviour, and patient education materials | Not described | 1 x group education meeting with consensus procedure; 1 x 2-hour group education session for GP and pharmacists' assistants; monitoring and feedback of prescribing behaviour at 6 months post-intervention | Not described | Not described | Not described | Not described       |

ARI: acute respiratory infection; GP: general practitioner; N/A: not applicable; SDM: shared decision making